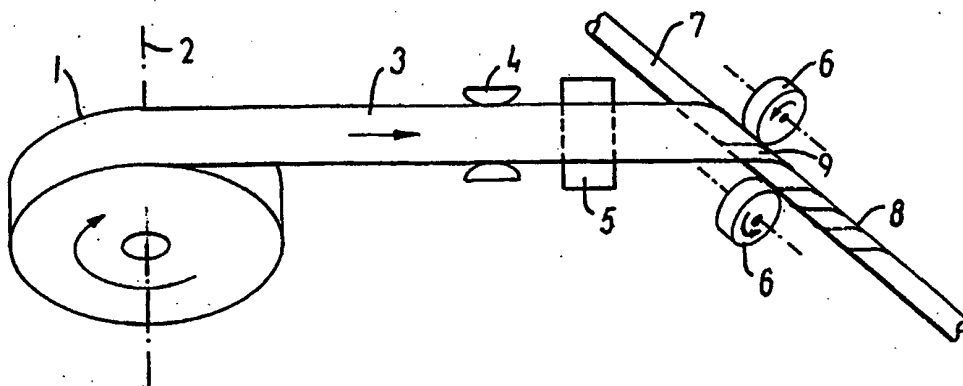




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B31C 3/00, 11/04, B05C 1/16	A1	(11) International Publication Number: WO 99/01276 (43) International Publication Date: 14 January 1999 (14.01.99)
(21) International Application Number: PCT/DK98/00293 (22) International Filing Date: 1 July 1998 (01.07.98) (30) Priority Data: 97110702.4 1 July 1997 (01.07.97) EP (71) Applicant (for all designated States except US): SKJERN PAPIRFABRIK A/S [DK/DK]; Birkvej 14, DK-6900 Skjern (DK). (72) Inventors; and (75) Inventors/Applicants (for US only): KNUDSEN, Finn [DK/DK]; Klostervænget 16, DK-6900 Skjern (DK). MARKUSSEN, Keld [DK/DK]; Sønderkær 3, DK-7400 Herning (DK). ANDERSEN, Lone [DK/DK]; Nordre Strandvej 162A, DK-3140 Ålsgårde (DK). (74) Agent: BUDDE, SCHOU & CO. A/S; Vestergade 31, DK-1456 København K (DK).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: METHOD OF MAKING CARTON TUBES, APPARATUS FOR MAKING CARTON TUBES BY CARRYING OUT THE METHOD, AND TUBULAR BODY MADE BY CARRYING OUT THE METHOD

**(57) Abstract**

In a method of making a carton tube (8) by winding a carton strip (3) with a layer of adhesive (not shown) onto a mandrel (7), a supply of wide sheet carton material (10) is coated with exception of its peripheral areas (11) with an activatable adhesive, said wide sheet is divided into strips that are fed to the mandrel (7) whereby the adhesive is activated just before the strip (3) reaches the mandrel. By proceeding in this manner, a spillage of adhesive is avoided throughout the production process.

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METHOD OF MAKING CARTON TUBES, APPARATUS FOR MAKING CARTON
TUBES BY CARRYING OUT THE METHOD, AND TUBULAR BODY MADE BY
CARRYING OUT THE METHOD

5

TECHNICAL FIELD

The present invention relates to a method of making carton tubes as defined in claim 1.

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BACKGROUND ART

Methods of the kind referred to above start with providing a wide sheet of carton material. This wide sheet is then divided into strips of a width that is suitable for making the tubes. The strips are coated with an adhesive and advanced towards and onto a mandrel to form carton tubes.

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When making carton tubes in this manner, problems frequently arise due to surplus adhesive being deposited on machine parts, such as scrapers or guides, eventually preventing the machine from operating properly, unless care is taken to remove the adhesive thus having been deposited. In practice this means that the operation must be under constant or at least frequent supervision.

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DISCLOSURE OF THE INVENTION

It is the object of the present invention to provide a method of the kind referred to above, with which it is possible to make carton tubes or similar articles in a process not requiring constant supervision, and this object is achieved with a method of said kind, according to the present invention exhibiting the features set forth in claim 1. By proceeding in this manner, the process of applying the adhesive to the sheet material can take place, so that no adhesive in a condition, in which it can be deposited in an undesired manner on parts of the machine, will be present in the

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latter in any step of the method. Preferably, the wide sheet material will be provided with a coat of adhesive at some central location comprising specialized equipment for applying adhesive to the sheet material and winding the latter with the adhesive in a non-tacky state into rolls.

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In a preferred embodiment the adhesive is a water-soluble adhesive.

The present invention also relates to

- an accumulation of sheet material, set forth in claim 11,
- 10 - a machine for making carton tubes by carrying out the method, set forth in claim 12, and
- a tubular body being made by carrying out the method, set forth in claim 13.

15 BRIEF DESCRIPTION OF THE DRAWING

In the following detailed part of the present description, the invention will be explained in more detail with reference to the drawings, in which the principle of the method according to the invention is illustrated using a bare minimum of diagrammatically shown components. Figure 1 shows a supply of wide sheet carton material. Figure 2 shows the strip material being advanced onto the mandrel.

25 DESCRIPTION OF THE PREFERRED EMBODIMENT

A wide sheet of carton material 10 as shown in Figure 1 has peripheral areas 11. The wide sheet carton material is coated with an adhesive that is normally not tacky but which can be made tacky by an activating step. When the adhesive is applied to coat the sheet it is normally in an active state. Therefore, the peripheral areas 11 are left uncoated. In this way, no adhesive is spilled during the coating process. The coated wide sheet carton material 10 can then be accumulated, preferably in the form of rolls 12.

The wide sheet carton material 10 is divided into sections of strip material 3 as indicated by the intersected lines in Figure 2. The sections originating from the peripheral areas are not further processed and can be recycled. The other fully coated sections 3 can be accumulated, preferably in the form of rolls 1. The fully coated sections 3 are further processed in an apparatus as shown in Figure 2. In the preferred embodiment the adhesive is water-soluble and consequently the coated strips and the finished rolls are fully recyclable. The method of making carton rolls according to the present invention is thus highly environmentally friendly.

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The parts of and accessories to an apparatus according to the invention shown in Figure 2 are

- a roll 1 rotatable about
 - an axis 2 so as to unwind
 - 15 - a carton strip 3 passing through
 - braking, guiding and/or tensioning means 4, and further through
 - an activating unit 5, from which it is helically wound whilst being driven by
 - friction rollers 6, in turn driven by suitable means (not shown), about
 - a stationary mandrel 7,
 - 20 thus forming a carton tube 8, such as of the type used to make cores in toilet rolls.
- It should be noted that the friction rollers 6 are merely shown to symbolize the means for rotating the tube 8 on the mandrel 7. In practice, a belt mechanism will normally be used, providing a greater area of contact with the tube.
- 25 The carton strip 3 has previously been coated with a thin layer of adhesive of the type that can be made to change from a non-tacky to a tacky state, the non-tacky state being the state within the roll 1 and along the strip 3 as far as the activating unit 5. When passing through the activating unit 5, the adhesive on the strip 3 is changed into the tacky state, in which it remains until having been incorporated in
- 30 the carton tube 8. From that point, the process of removing the tube 8 from the mandrel 7 continues in any suitable manner.

The roll 1 is manufactured in much the same manner as known tape rolls with a coat of adhesive in an inactive state, such as dry water-soluble adhesive, used e.g.

for closing and sealing cardboard boxes. This means that a supply of carton strip without adhesive, e.g. a roll of carton strip as supplied by a manufacturer of such strip, is placed in a suitable unwinding stand or the like, and then pulling the far end of the strip through

- 5 - a adhesive-applying unit, in which a thin layer of adhesive of the activable type referred to above is applied to the strip, further through
- a adhesive-inactivating unit - in the case of water-soluble adhesive simply a drier - capable of making the adhesive non-tacky, to end up in
- a suitable winding stand, in which the strip carrying the dried adhesive is wound
- 10 to form a roll like the roll 1 shown.

Clearly, such equipment can be designed and constructed by a skilled person without the need of further guidance.

15 In the exemplary embodiment shown, the activating unit 5 is placed at some distance from the mandrel 7, but it may just as well be placed close to it, provided - of course - that its activating function is not compromised. Thus, if a dried, water-soluble adhesive is used on the strip 3, then it may be advantageous to have the activating unit 5 at some distance from the mandrel 7 as shown, so as to give the water being sprayed onto the strip 3 by suitable spray nozzles (not shown) in the

20 activating unit 5 time to penetate into the adhesive and make it tacky.

In the case of heat-activable adhesive, the activating unit 5 - in the form of a heat source (not shown) - may be placed closer to the mandrel 7, even some distance downstream from the winding-on point 9, i.e. down and to the right along the

25 mandrel 7.

In the exemplary embodiment shown, the strip 3 is wound helically about the mandrel 7, the latter having a circular cross section allowing it to remain stationary. The scope of the invention does, however, extend to processes differing from the

30 one illustrated. Thus, a strip may be wound in parallel layers on top of each other, either on a round mandrel to form a short cylindrical tube, or on a rotating mandrel having, say, a square, rectangular or other polygonal cross section, so as to form the side walls in a box.

In the exemplary embodiment shown, a single strip 3 coated with adhesive on one side is used for making the tube 8. The scope of the invention does, however, extend to processes based on two or more strips, of which one or more may not have a coat of adhesive, whereas one or more may have such a coat on both sides, so that the strips are made to interleave in a suitable manner for forming e.g. a tube.

LIST OF PARTS

	1	roll
	2	axis
5	3	carton strip
	4	braking/guiding/tensioning means
	5	activating unit
	6	friction rollers
	7	mandrel
10	8	carton tube
	9	winding-on point
	10	wide sheet carton
	11	peripheral area
	12	roll of wide sheet

CLAIMS

1. Method of making carton tubes (8) consisting of at least two layers of sheet material (3) held together by adhesive, said method being of the kind comprising
5 the following steps:
 - a) providing a supply of wide sheet carton material (9),
 - b) coating said wide sheet carton material (9) with exception of its peripheral areas extending in the direction of supply with a coat of adhesive that is normally not tacky but can be made tacky by an activating step,
 - 10 c) dividing said wide sheet (9) in sections forming strips (3) of carton sheet material that are fully coated and in strips originating from said peripheral area (10) that are not fully coated,
 - d) providing a mandrel (7) with external dimensions corresponding to the internal dimensions of the tube to be made, and
 - 15 e) advancing a supply of said fully coated strips (3) of sheet material towards said mandrel (7),
 - f) activating the adhesive, and
 - g) further advancing said supply of fully coated strips (3) of sheet material onto said mandrel (7) so as to wind said sheet supply material on it in a manner
20 causing said adhesive to make the layers of sheet material adhere to themselves and/or to one another so as to form a rigid tubular body.
2. Method according to claim 1 and comprising the use of braking, guiding and/or tensioning means in contact with said sheet material and guiding same
25 towards said mandrel, wherein said activating step is carried out at a position between said braking, guiding and/or tensioning means and said mandrel.
3. Method according to claim 1 or 2 and comprising the making of accumulations (1,12) of said wide sheet or strip material and subsequently using
30 said accumulations for supplying said sheet material being used in the method, wherein said accumulations are made by accumulating sheet material having been provided with a coat of adhesive of said kind.

4. Method according to claim 3, comprising the step of making and using said accumulations in the form of rolls of said sheet material.
5. Method according to any of the claims 1-4, in which the adhesive is water-soluble.
6. Method according to any one or any of the claims 1-5, comprising the step of using a coat of adhesive capable of being made tacky by the application of a solvent, and using such a solvent for carrying out said activating step.
7. Method according to claim 6, comprising the step of using a coat of adhesive capable of being made tacky by the application of water, and using water for carrying out said activating step.
8. Method according to claim 6 or 7, comprising the step of spraying said solvent or water, respectively, onto said coat of adhesive.
9. Method according to any one or any of the claims 1-4, comprising the step of using a coat of adhesive capable of being made tacky by the application of heat or electromagnetic radiation, and applying heat or electromagnetic radiation, respectively, for carrying out said activating step.
10. Method according to claims 1-9, wherein the strips originating from said peripheral areas have a width smaller than said fully coated strips.
11. Method according to claims 1-10, wherein the fully coated strips have a width in the range of 1/3 to 1/100 of said wide sheet material.
12. Accumulation (1,12) of wide sheet material (9) or strip material (3) made by the method according to claim 3 or 4.
13. Apparatus for making carton tubes by carrying out the method according to any one or any of the claims 1-8, said machine comprising a means for supplying wide sheet material (10), a means for carrying out the coating step, a means to

divide the wide sheet into sections, a mandrel (7) for winding strips of sheet material (3) so as to form a rigid tubular body (8), and comprising activating means (5) adjacent said mandrel (7) for carrying out said activating step by subjecting said sheet material (3) to a spray of solvent or water or to heat or electromagnetic radiation, respectively, according to the type of coat of adhesive having been applied to said sheet material.

14. Tubular body made by winding sheet material having a coat of adhesive so as to form a solid body consisting of layers of said sheet material held together by said coat of adhesive, being made by carrying out the method according to any one or any of the claims 1-10.

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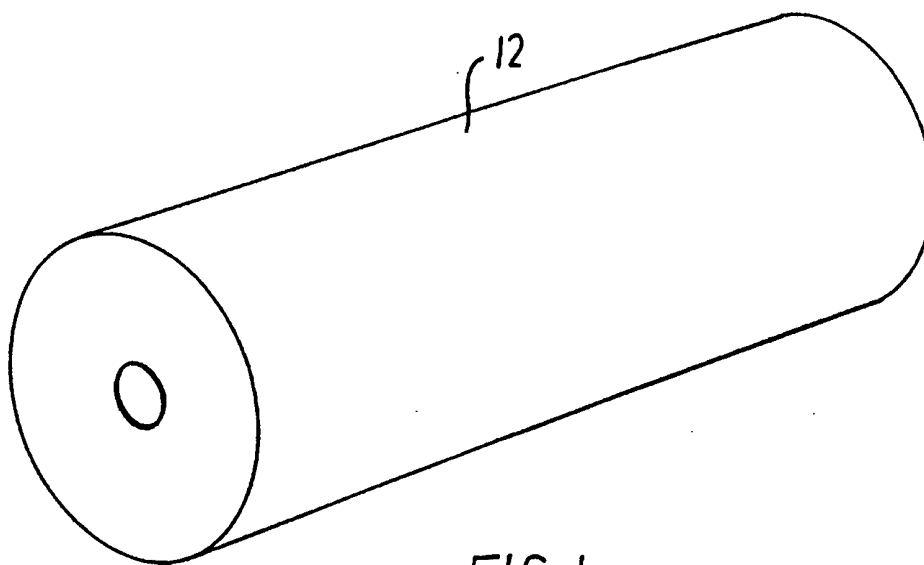
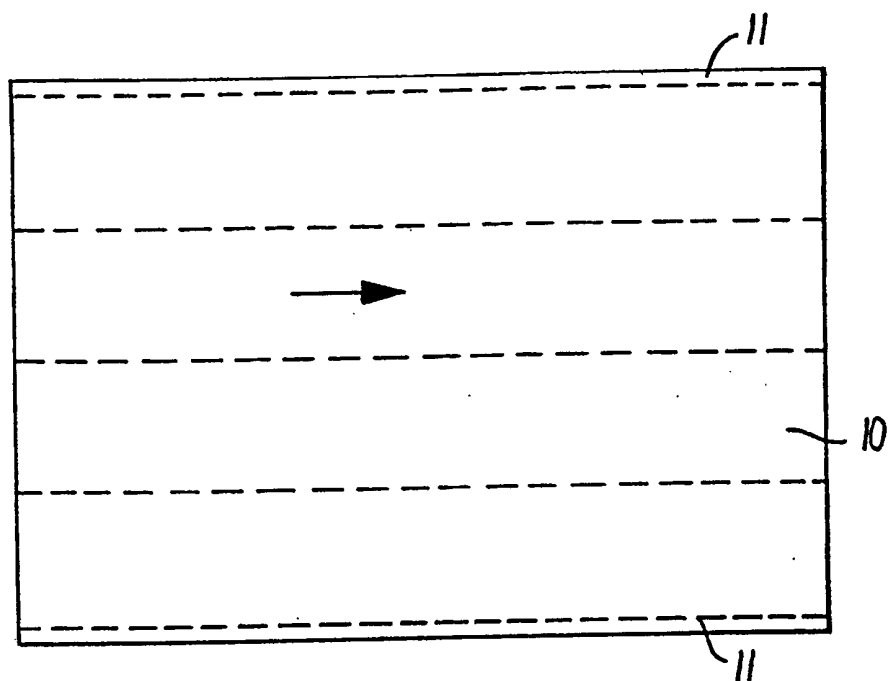


FIG. 1

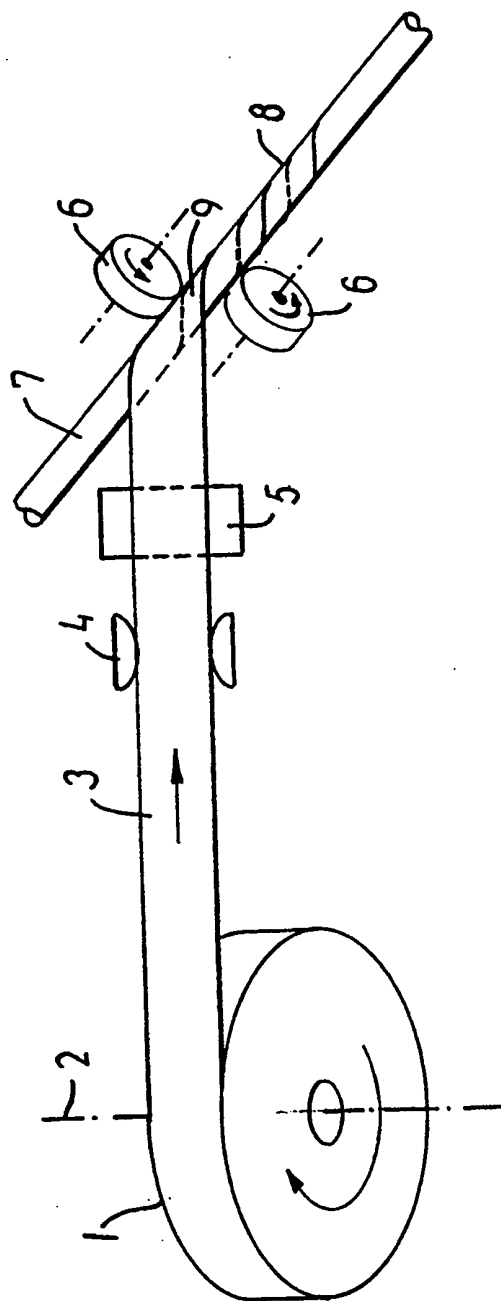


FIG. 2

INTERNATIONAL SEARCH REPORT

International Application No

PCT/DK 98/00293

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B31C3/00 B31C11/04 B05C1/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B31C B31F B32B B05D C09J B05C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 91 07 254 U (MAUSER-WERKE GMBH) 14 August 1991 see page 2, paragraph 3 - page 3, paragraph 1 see page 4, paragraph 2 - paragraph 3 see figures 1-3	1-14
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Date of the actual completion of the international search

5 October 1998

Date of mailing of the international search report

22/10/1998

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